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Takuo Nishikawa

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COHEN, PONTANI, LIEBERMAN & PAVANE LLP
551 FIFTH AVENUE
SUITE 1210
NEW YORK, NY 10176

EXAMINER

NGUYEN, LUONG TRUNG

ART UNIT

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/553,897	Applicant(s) NISHIKAWA ET AL.	
	Examiner LUONG T. NGUYEN	Art Unit 2622	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 October 2009 and 06 January 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 7-13 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 7-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed on 10/28/2009 have been fully considered but they are not persuasive.

In re page 9, Applicants argue that the combination of Hoshino and Shinomiya fails to teach or suggest the recited “reinforcing member,” because the printed circuit board 101 of Shinomiya does not disclose the claimed features of the “reinforcing member”.

In response, regarding claim 1, Applicants recites claim 1 with limitation “a reinforcing member which is made of a glass or ceramic material having a linear expansion coefficient of 1×10^{-5} (cm/cm/°C) or less and is attached to the other surface side of said circuit board to reinforce said circuit board.” The Examiner considers that claim 1 as recited still does not distinguish from Hoshino reference in view of Shinomiya reference. Hoshino discloses “a reinforcing member” as plate 13, figures 3A-3B, column 3, lines 30-50; column 4 lines 8-35, which is attached to the other side of flexible wiring board 4 to reinforce the flexible wiring board 4, which corresponds to “circuit board”. Hoshino et al. only fails to disclose a reinforcing member which is made of a glass or ceramic material. However, Shinomiya discloses a solid state imaging apparatus in which the printed circuit rigid board 101, which made of a material such as ceramics or glass epoxy, is attached to the printed flexible circuit board 201 (figure 13, paragraph [0002], the printed circuit rigid board 101 corresponds to reinforcing member). The printed circuit rigid board 101, which read as “reinforcing member” since it is attached to printed

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flexible circuit board 201 to reinforce the printed flexible circuit board 201. Therefore, the combination of Hoshino and Shinomiya teach or suggest the recited “reinforcing member.”

In re page 10, Applicants argue that Shinomiya cannot be considered to teach or suggest “an imaging element which is connected, by flip-chip mounting, to one surface side of said circuit board.”

In response, regarding claim 1, the Examiner considers that Hoshino et al. discloses the feature “an imaging element which is connected, by flip-chip mounting, to one surface side of said circuit board” (Hoshino et al., imaging element 11, figures 3A-3B, column 3, lines 30-50; column 4 lines 8-35).

In re page 10, Applicants argue that Shinomiya cannot be considered to teach or suggest “a reinforcing element which is made of a glass or ceramic material having a linear expansion coefficient of 1×10^{-5} (cm/cm/°C) or less and is attached to the other surface side of said circuit board to reinforce said circuit board”, as recited in independent claim 1.

In response, the Examiner considers that Hoshino and Shinomiya disclose the recited “a reinforcing member which is made of a glass or ceramic material” as discussed above, and Yaguchi et al. discloses “a glass or ceramic material having a linear expansion coefficient of 1×10^{-5} (cm/cm/°C)”, see Yaguchi et al., column 1, lines 57-65).

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Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 8, 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoshino et al. (US 7,375,757) in view of Shinomiya (US 2001/0055073) further in view of Yaguchi et al. (US 6,512,176).

Regarding claim 1, Hoshino et al. discloses an imaging unit mounted on a compact portable terminal equipment, comprising:

a flexible printed circuit board (flexible wiring board 4, figures 3A-3B, 4, column 3, lines 30-50) having two sides and an opening portion at a predetermined position;

an imaging element (imaging element 11, figures 3A-3B, column 3, lines 30-50; column 4 lines 8-35) which is connected, by flip-chip mounting, to one side of said circuit board so as to cover at least part of the opening portion and expose an imaging area;

a reinforcing member (plate 13, figures 3A-3B, column 3, lines 30-50; column 4 lines 8-35) is attached to the other side of said circuit board to reinforce said circuit board;

an optical member (lens unit 12, figure 3A, column 3, lines 10-67) which is provided to guide object light from a surface on the reinforcing member side to the imaging area of said imaging element through the opening portion.

Hoshino et al. fails to specifically disclose a reinforcing member which is made of a glass or ceramic material. However, Shinomiya discloses a solid state imaging apparatus in which the

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printed circuit rigid board 101, which made of a material such as ceramics or glass epoxy, is attached to the printed flexible circuit board 201 (figure 13, paragraph [0002], the printed circuit rigid board 101 corresponds to reinforcing member). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device in Hoshino et al. by the teaching of Shinomiya in order to reduce the volume of the electrical connection portions between the solid state imaging element and the printed circuit board [0009].

Hoshino et al. and Shinomiya fail to specifically disclose a glass or ceramic material having a linear expansion coefficient of 1×10^{-5} (cm/cm/°C) or less. However, Yaguchi et al. discloses a semiconductor conductor device formed of an insulating tape in which the insulating tape 2 is made of a base material such as glass/epoxy resin of which the linear expansion coefficient is about 10×10^{-6} /°C (column 1, lines 57-65). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device in Hoshino et al. and Shinomiya by the teaching of Yaguchi et al. in order to improve the reliability of the device.

Regarding claim 8, Hoshino et al. discloses wherein said flexible printed circuit board includes no adhesive layer between a base matrix and a copper layer (column 3, lines 36-51).

Regarding claim 10, Hoshino et al. discloses a portable terminal equipment characterized by mounting an imaging unit define in claim 1 (camera system 1, figure 2, column 1, lines 12-17; column 3, lines 10-19).

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4. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hoshino et al. (US 7,375,757) in view of Shinomiya (US 2001/0055073) and Yaguchi et al. (US 6,512,176) further in view of Matsuhira et al. (US 6,528,889).

Regarding claim 7, Hoshino et al., Shinomiya and Yaguchi et al. fail to disclose wherein when said reinforcing member is to be attached to said flexible printed circuit board, a thermosetting adhesive is used. However, Matsuhira et al. discloses an electronic circuit device in which the circuit board is caused to adhere to the IC 4 by thermocompression bonding at the temperature and pressure required for performing the Au-Sn joint process (figure 3, column 3, lines 25-67). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device in Hoshino et al., Shinomiya and Yaguchi et al. by the teaching of Matsuhira et al. in order to allow the joint reliability of an IC to be improved (column 3, lines 52-55).

5. Claims 9, 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoshino et al. (US 7,375,757) in view of Shinomiya (US 2001/0055073) and Yaguchi et al. (US 6,512,176) further in view of Atarashi et al. (US 2004/0061799).

Regarding claim 9, Hoshino et al. discloses an imaging unit mounted on a compact portable terminal equipment, the imaging comprising:

a flexible printed circuit board (flexible wiring board 4, figures 3A-3B, 4, column 3, lines 30-50) having two sides and an opening portion at a predetermined position;

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an imaging element (imaging element 11, figures 3A-3B, column 3, lines 30-50; column 4 lines 8-35) which is connected, by flip-chip mounting, to one side of said

circuit board so as to cover at least part of the opening portion and expose an imaging area;

a reinforcing member (plate 13, figures 3A-3B, column 3, lines 30-50; column 4 lines 8-35) is attached to the other side of said circuit board to reinforce said circuit board;

an optical member (lens unit 12, figure 3A, column 3, lines 10-67) which is provided to guide object light from a surface on the reinforcing member side to the imaging area of said imaging element through the opening portion.

Hoshino et al. fails to specifically disclose a reinforcing member which is made of a glass or ceramic material. However, Shinomiya discloses a solid state imaging apparatus in which the printed circuit rigid board 101, which made of a material such as ceramics or glass epoxy, is attached to the printed flexible circuit board 201 (figure 13, paragraph [0002], the printed circuit rigid board 101 corresponds to reinforcing member). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device in Hoshino et al. by the teaching of Shinomiya in order to reduce the volume of the electrical connection portions between the solid state imaging element and the printed circuit board [0009].

Hoshino et al. and Shinomiya fail to specifically disclose a glass or ceramic material having a linear expansion coefficient of 1×10^{-5} (cm/cm/°C) or less. However, Yaguchi et al. discloses a semiconductor conductor device formed of an insulating tape in which the insulating tape 2 is made of a base material such as glass/epoxy resin of which the linear expansion coefficient is about 10×10^{-6} /°C (column 1, lines 57-65). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device in

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Hoshino et al. and Shinomiya by the teaching of Yaguchi et al. in order to improve the reliability of the device.

Hoshino et al., Shinomiya and Yaguchi et al. fail to specifically disclose wherein notched portions are formed in the opening portion of said flexible printed circuit board. However, Atarashi et al. discloses an image pickup device having a flexible base board FPC on which four cutout portions 15 are formed at four corners of the opening portion 10 of the flexible base board FPC (figure 10, paragraph [0149]). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device in Hoshino et al., and Shinomiya and Yaguchi et al. by the teaching of Atarashi et al. in order to allow an amount of expansion of the flexible base board FPC is absorbed surely by the cutout portions, which is preferable (paragraph [017]).

Regarding claim 12, Hoshino et al. discloses wherein said flexible printed circuit board includes no adhesive layer between a base matrix and a copper layer (column 3, lines 36-51).

Regarding claim 13, Hoshino et al. discloses a portable terminal equipment characterized by mounting an imaging unit define in claim 9 (camera system 1, figure 2, column 1, lines 12-17; column 3, lines 10-19).

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6. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hoshino et al. (US 7,375,757) in view of Shinomiya (US 2001/0055073) and Yaguchi et al. (US 6,512,176) further in view of Atarashi et al. (US 2004/0061799) and Matsuhira et al. (US 6,528,889).

Regarding claim 7, Hoshino et al., Shinomiya, Yaguchi et al. and Atarashi et al. fail to disclose wherein when said reinforcing member is to be attached to said flexible printed circuit board, a thermosetting adhesive is used. However, Matsuhira et al. discloses an electronic circuit device in which the circuit board is caused to adhere to the IC 4 by thermocompression bonding at the temperature and pressure required for performing the Au-Sn joint process (figure 3, column 3, lines 25-67). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device in Hoshino et al., Shinomiya, Yaguchi et al. and Atarashi et al. by the teaching of Matsuhira et al. in order to allow the joint reliability of an IC to be improved (column 3, lines 52-55).

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

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CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to LUONG T. NGUYEN whose telephone number is (571)272-7315. The examiner can normally be reached on 7:30AM - 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, DAVID L. OMETZ can be reached on (571) 272-7593. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/LUONG T NGUYEN/
Primary Examiner, Art Unit 2622
01/29/10

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